

3. On Collections of the Cape Verde Islands Marine Fauna, made by Cyril Crossland, M.A. (Cantab.), B.Sc. (Lond.), F.Z.S., of St. Andrews University, July to September, 1904.*—The Hydroids. By JAMES RITCHIE, M.A., B.Sc., Fullerton Scholar, University of Aberdeen †.

[Received April 18, 1907.]

(Plates XXIII.—XXVI.‡ and Text-figures 142–144.)

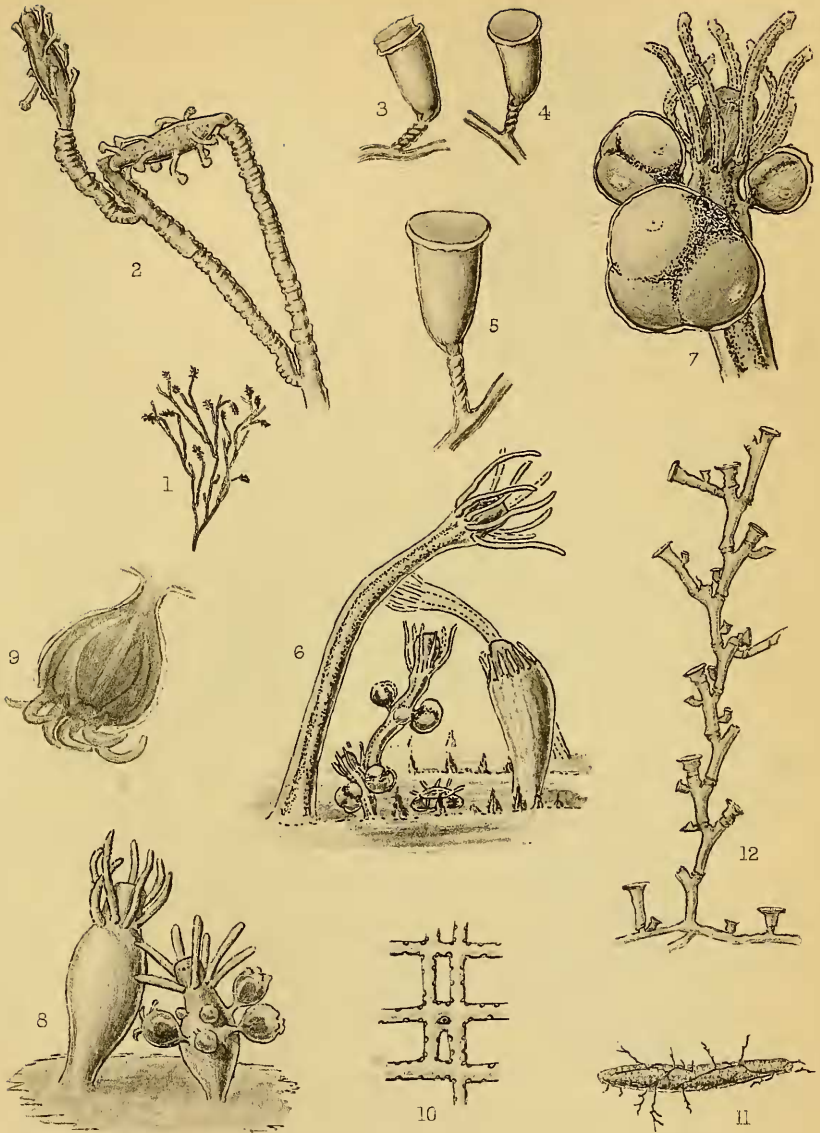
The forms described in the present paper were entrusted to me for determination by Mr. Crossland, who collected them in various localities off the Cape Verde Islands. Although the collection is not a large one, it forms a useful addition to our rather meagre knowledge of the Hydroid fauna of the northern portion of the west coast of Africa. To the north of the Cape Verde Islands specimens have been recorded from the Canary Islands, from Madeira, from the Azores, and from the Soudan coast; from the south the 'Challenger' records a solitary species, *Cryptolaria diffusa* Allm. from Sierra Leone; while from the islands themselves, so far as I can learn, records have been made by only four workers §. In 1883 Allman, in his Report on the Plumularians collected by the 'Challenger,' described the type of a new genus, *Streptocaulus pulcherrimus* Allm., found at Porto Praya in 100 fathoms. In July 1885 Mr. J. J. Quelch described a small collection of deep-sea Hydroids, comprising nine species, and obtained from the cable off St. Vincent in a depth of over 500 fathoms, the species described being *Eudendrium annulatum* Norman 1864, *Lafoëa tenellula* Allman 1877, *Zygophylax profunda* Quelch 1885, *Plumularia variabilis* Quelch 1885, *P. delicatula* Quelch 1885, *Antennularia irregularis* Quelch 1885, *A. profunda* Quelch 1885, *Aglaophenia acacia* Allman 1883, and *Streptocaulus pulcherrimus* Allman 1883. More recently Professor J. Versluys has described two species from Isle Branco, one of the Windward Group, *Sertularia (Desmoscyphus) brevicyathus* (Vers. 1899), and *Desmoscyphus inflatus* Vers. 1899, a synonym for the *D. gracilis* of Allman 1888, which has been renamed *Sertularia versluysi* by Professor Nutting (1904). Of these the latter occurs in our collection, with the important addition that the gonosome is also present and is here described for the first time. Lastly, within the past month or two collections made by the 'Talisman' in 1883 have been described by Dr. Armand Billard (1907), and these include a few species from two localities off the Islands. In lat.

* The expenses of Mr. Crossland's collecting trip were borne by the Carnegie Trustees.

† Communicated by the SECRETARY.

‡ For explanation of the Plates, see p. 514.

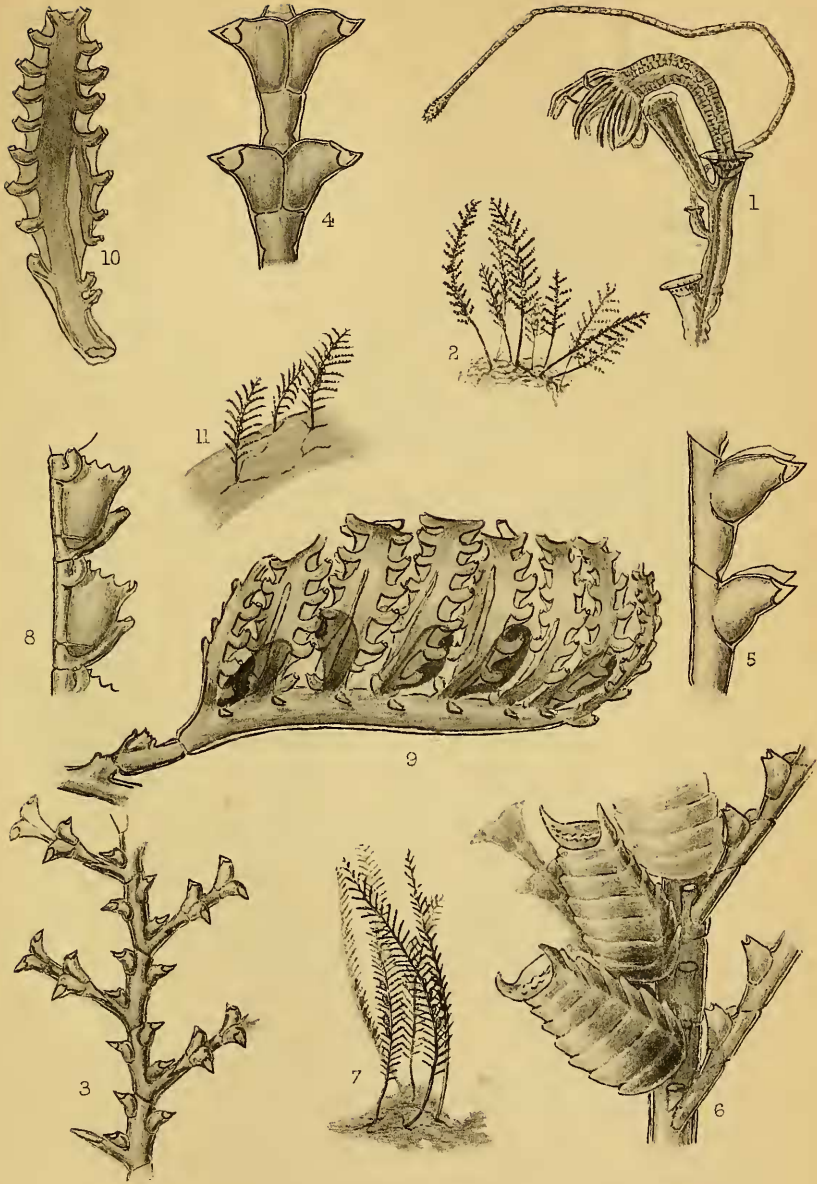
§ Since this paper was written I have found in the collections made by the Scottish National Antarctic Expedition on its homeward voyage two species from St. Vincent which were not represented among the specimens described in the Report on the 'Scotia' Hydroid Collection (Ritchie, 1907). These are *Eucopella cenata*? Hartlaub, 1901, and *Sertularella fusiformis*? Hincks, 1861, both of which are additions to the recorded Hydroid fauna of the Islands.



Jas. Ritchie, del.

London Stereoscopic Co. imp

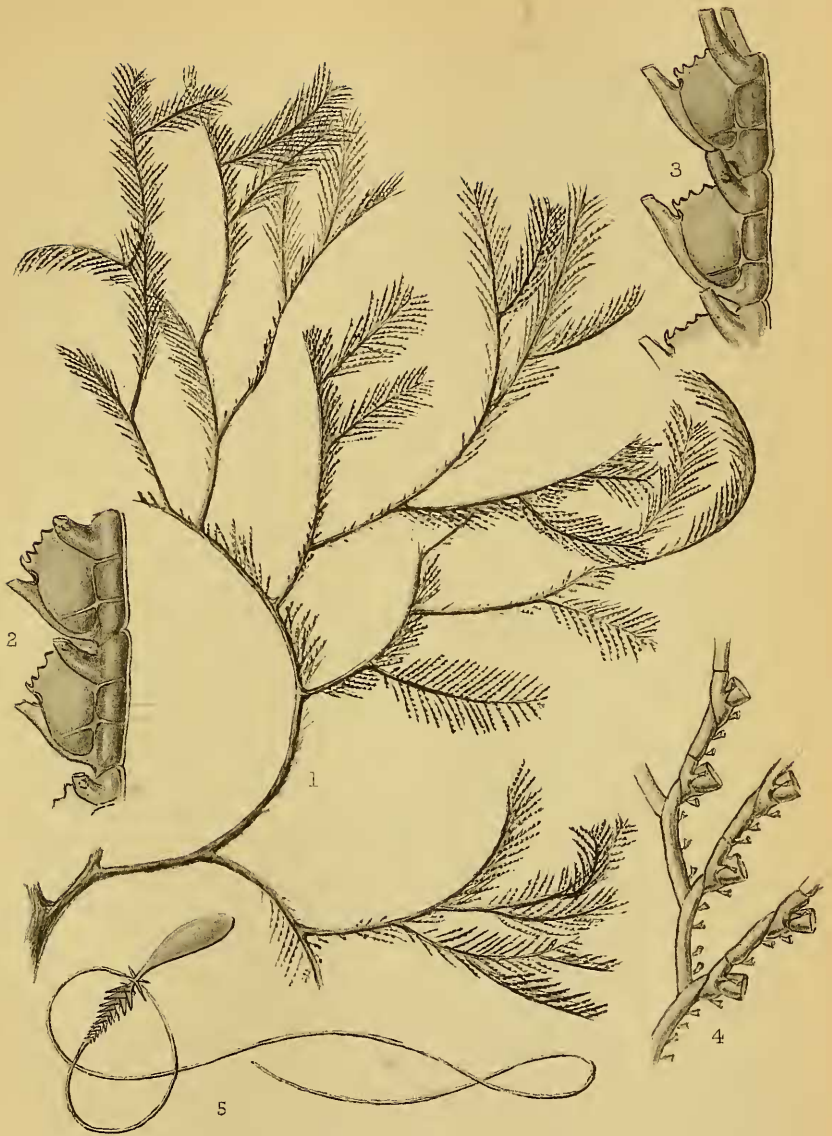




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HYDROIDS FROM CAPE VERDE ISLANDS.



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HYDROIDS FROM CAPE VERDE ISLANDS.

17° 1' N. and long. 27° 24' W. (Paris 0°) at a depth of 105 metres there were obtained *Diphasia pinaster* (Ellis & Sol. 1786), *Antennularia ramosa* Lamarck 1816, and *Theocarpus myriophyllum* var. *bedoti* Billard 1907. In lat. 16° 52'–16° 53' N. and long. 27° 30'–27° 26' W. at a depth of 400–580 metres, *Diphasia pinaster* and *Theocarpus myriophyllum bedoti* were again found.

The present collection is littoral, the greatest depth at which specimens were gathered being 15 fathoms, while the majority were obtained in shore-pools or in quite shallow water. Hence it is not surprising to find that of the species previously described from the Islands only one, *Sertularia versluysi* above mentioned, should recur among Mr. Crossland's specimens.

The collection contains in all 27 species, of which 18—one of them here represented by a new variety—have been previously described. Several of these species, which are distributed among 14 genera, have been recorded from more than one locality. For the remaining specimens 9 new species have been established, one species being referred to a new genus. In all representatives of 20 genera occur in the collection.

The list of species is as follows:—

I. GYMNOBLASTEAE.

Family CORYNIDÆ.

Coryne (?) *dubium*, sp. n.

Family PENNARIIDÆ.

Pennaria cavolinii Ehrenberg 1832.

Family TUBULARIIDÆ.

Tubularia humilis Allman 1864.

„ *solitaria* Warren 1906.

Family CLAVIDÆ.

Soleniopsis dendriformis, gen. et sp. n.

Family BOUGAINVILLIIDÆ.

Hydractinia verdi, sp. n.

Podocoryne anechinata, sp. n.

Family EUDENDRIIDÆ.

Eudendrium ramosum Linn. 1758.

II. CALYPTOBLASTEAE.

Family HALECIIDÆ.

Halecium beanii Johnst. 1838.

Ophiodes caciniiformis, sp. n.

Family LAFODIIDÆ.

Filellum serpens (Hassall 1852).

Cuspidella humilis Hincks MS. & 1866.

Family CAMPANULARIIDÆ.

Clytia geniculata Thornely 1904.

Obelia dichotoma (Linn. 1758).

Gonothyræa gracilis (Sars 1851).

Campanularia caliculata Hincks 1863.

„ *ptychoecyathus* Allman 1888.

„ *mutabilis*, sp. n.

Family SERTULARIIDÆ.

- Sertularia distans* Lamx. 1816.
 „ *mayeri* Nutting 1904.
 „ *versluysi* Nutting 1904.
 „ *levimarginata*, sp. n.

Family PLUMULARIIDÆ.

- Plumularia halecioides* Alder 1859.
Monostæchas quadridens (McCrary 1857).
Aglaophenia marginata, sp. n.
Lytocarpus grandis, var. *unilateralis*, var. n.
 „ *crosslandi*, sp. n.

Of the 18 hitherto known forms above mentioned, 10 are recognised as British species, while 5 of the remainder (*Campanularia ptychocyathus*, *Sertularia mayeri*, *S. versluysi*, *Lytocarpus grandis*, *Monostæchas quadridens*) are, with the exception of the last which has been recorded from the Indian Ocean (Thornely, 1904), distinctively American. This contingent is probably to be accounted for by the oceanic whirlpool the centre of which is marked by the Sargasso Sea and the streams of which wash the shores of the West Indies, of eastern Mexico, and of the eastern United States, and, circling in the North Atlantic, sweep past the Azores, Madeira, and the Cape Verde Islands.

The collection, as might be expected in a littoral one, is comparatively rich in gymnoblastic forms and includes an interesting species, peculiar in branching and in gonophore, which has been made the type of a new genus, *Soleniopsis*.

We note also, as Pictet has already remarked (Pictet, 1893), that of those species which occur both in temperate and in tropical waters, the individuals existing in the colder seas are, in general, larger and more sturdy than their tropical specific equivalents.

The outlines of the figures, both in the plates and in the text, with the exception of those representing the appearance of the specimens to the unaided eye, were drawn with the help of Zeiss's camera lucida.

The localities from which Mr. Crossland obtained his specimens are shown below:—

ST. VINCENT, CAPE VERDE ISLANDS.

(1) GENERAL.

- (a) From tidal pool, 25th July, 1904.
Pennaria cavolinii Ehr.
- (b) 2 fathoms, among coral, 22nd July, 1904.
Pennaria cavolinii Ehr.
Sertularia mayeri Nutt.
Plumularia halecioides Hincks.
- (c) 10 fathoms, 27th July, 1904.
Gonothyræa gracilis Sars.
Campanularia ptychocyathus Allm.
- (d) 15 fathoms, 30th July, 1904.
Monostæchas quadridens (McCrary).
Lytocarpus grandis, var. *unilateralis*, var. n.

- (e) From bottom of a lighter, 20th July, 1904.
Tubularia humilis Allm.
Cuspidella humilis Hincks.
Plumularia halecioides Alder.
Aglaophenia marginata, sp. n.
- (f) From bottom of a lighter, 30th July, 1904.
Pennaria cavolinii Ehr.
Tubularia humilis Allm.
 „ *solitaria* Warren.
Soleniopsis dendriformis, gen. et sp. n.
Halecium beanii Johnst.
Filillum serpens (Hassall).
Cuspidella humilis Hincks.
Clytia geniculata Thorn.
Obelia dichotoma Linn.
Campanularia ptychocyathus Allm.
 „ *mutabilis*, sp. n.
- (2) MATTIOTA, ST. VINCENT HARBOUR.
Sertularia lævmarginata, sp. n.
Lytocarpus crosslandi, sp. n.

(3) PORTO GRANDE.

- (a) Shore-pools.
Campanularia caliculata Hincks.
 „ *ptychocyathus* Allm.
Sertularia distans Lamx. 1816.
 „ *mayeri* Nutt.
- (b) 10 fathoms.
Hydractinia verdi, sp. n.

PORTO PRAYA, SANTIAGO, CAPE VERDE ISLANDS.

- (a) Piles of pier, 12th August, 1904.
Coryne (?) *dubium*, sp. n.
Campanularia mutabilis, sp. n.
Sertularia versluysi Nutt.
- (b) 5 fathoms, 9th August, 1904.
Podocoryne anechinata, sp. n.
- (c) 10 fathoms, 12th August, 1904.
Eudeadrium ramosum Linn.
Ophiodes caciniiformis, sp. n.

BOA VISTA, CAPE VERDE ISLANDS.

- Soleniopsis dendriformis*, gen. et sp. n.

I. GYMNOBLASTEAE.

Family CORYNIDÆ.

CORYNE (?) DUBIUM, sp. n. (Plate XXIII. figs. 1, 2.)

A species represented by small, irregularly ramified colonies growing upon a *Polysiphonia*-like red seaweed. The colonies are only about 7 mm. in height. The perisarc is transparent, tinged,

except towards the tips of the branches, with a faint brown. The stem is slender, 0.1 mm. in diameter, and soon breaks up into very numerous, irregularly disposed branches which, arising at a small angle, lie for a short distance almost parallel with their parent shoot and thereafter gradually diverge from it. Branches even of the fourth order are present. The colonies are wrinkled throughout, but less strongly in the middle portions of the polyp-bearing branches; while beneath the polyp, on the stems, and on the older portions of the branches distinct ringing occurs. There is no membranaceous cup surrounding the base of the hydranth. The hydranths are relatively long, 0.5 mm., slightly bulging beneath and tapering gradually upwards towards the tip and downwards to form a long "neck." The tentacles are from 0.1 to 0.15 mm. in length, and except for the distal four, which generally appear to be placed in a whorl, are scattered. They vary slightly in number. Thus of 10 heads examined, one bore 12 tentacles, four bore 13, three bore 14, and on two 15 were found.

Gonosome not present.

Locality. Growing on a seaweed taken from piles of pier. Porto Praya, Santiago, Cape Verde Islands; 12th August, 1904.

Owing to the absence of the gonosome this species cannot be given a definite generic place within the family Corynidae as defined by Delage (1901). Notwithstanding I have assigned a specific name to the form in order to facilitate references. The trophosome characters lie between those of *Actinogonium pusillum* (Van Beneden 1844; Hincks, 1868, p. 45; Allman, 1872, p. 272) and *Syncoryne sarsii* Lovén 1835. From the former it differs in having a more tapering polyp, numerous rings and wrinkles, and in lacking a membranaceous cup beneath the polyp; from the latter it is distinguished by the shape of its hydranth, its much smaller size, its complicated branching, its more frequent rings.

The specimens bear many creeping polyzoan colonies (*Clionella?*) and occasional stalked protozoa and diatoms.

Family PENNARIIDÆ.

PENNARIA CAVOLINII Ehrenberg 1832.

A number of colonies, frequently over 6 cm. in height, have been obtained from one locality. They agree in general with Allman's description (1872, p. 364), but the following variations may be noted:—The colonies are less robust than those described by Allman. The branches, while alternate, lie generally in two planes, every other branch being in the same plane, and these planes are set forward on the stem, as in many Plumularian species, so as to meet at an angle varying from almost 180° to less than 20°. Ringing is well marked, from four to six rings occurring on the stem above the origin of each branch, and a similar number at the base of the branch itself. Thus the ultimate hydranth-bearing ramuli, instead of being wholly ringed as described and figured by Allman, bear a small number of basal

rings; the remainder, which varies much in length, being smooth or very slightly crumpled.

The gonosomes, which are present in numbers, agree exactly with Allman's description.

The colonies here described agree in all but size with beautifully preserved specimens of the species from the Naples Biological Station.

Locality. St. Vincent, Cape Verde Islands. Obtained from bottom of a lighter, 30th July, 1904; by diving among coral in 2 fathoms of water, 22nd July, 1904; also fine colony in tidal pool, 25th July, 1904.

Family TUBULARIIDÆ.

TUBULARIA HUMILIS Allman 1864.

A few simple or slightly branched stems varying from 0.5 to 4 cm. in height, and 0.5 mm. in diameter, may be referred to this species. The specimens obtained in one dredging are much smaller than those described by Allman, varying from 5 to 12 mm. in height; but the following points have been relied on in identification:—simple or slightly branched stems with, here and there, faintly marked transverse rugosities; delicate, light-yellow perisarc; a cenosarc collar supporting the hydranth; small hydranths, 1.2 mm. in height, longer than broad, with, in the individuals examined, 17, 13, 11 tentacles in the distal whorl, and 19, 17 in the proximal. The tentacles are in a state of contraction, and consequently the proximal whorl is only 1.8 mm. in diameter from tip to tip.

Gonosome.—In the specimens obtained on the 30th of July gonophores are present in erect clusters borne on short pedicels. In some of the more mature, actinulae can be seen.

Locality. St. Vincent, Cape Verde Islands. Found growing on the bottom of a lighter on 20th and 30th July, 1904, and by diving among coral in 2 fathoms of water on 22nd July, 1904.

TUBULARIA SOLITARIA Warren 1906.

A few solitary individuals, 8 mm. in height, are growing upon a sponge-like layer encrusting a small lamellibranch shell. The individuals are fixed in the layer by a club-like, sometimes branched "root," and are crowned by a distal circle of stout tentacles 13 or 14 in number, the lower portions of which are adnate to the hypostome, appearing as strong ridges upon it. The proximal tentacles, which are more slender than the distal, arise from the broadened base of the hydranth in a whorl of about 30, rather more than in Dr. Warren's specimens. Otherwise, the present specimens, with delicate perisarc, distinct endodermal canals in the hydrocaulus, erect blastostyles originating just within the proximal whorl of tentacles and bearing from two to five or six gonophores, agree with the description of the type.

The gonophores in our specimens are mostly at an early stage,

showing in optical section a manubrium surrounded by a horse-shoe-shaped mass of generative plasma. In only one gonophore of the many examined was there a trace of actinula-formation, tentacles being indicated by apparently about 8 filaments.

Locality St. Vincent, Cape Verde Islands. Found on bottom of a lighter, 30th July, 1904.

Previous record, off Natal coast.

Family CLAVIDÆ.

SOLENIOPSIS*, gen. nov.

Type. *S. dendriiformis*, sp. n.

GENERIC CHARACTERS.—*Trophosome*. Colonies branched and fascicled. The branches originate from the division of a cœnosarcal strand into two portions which lie parallel and close to one another for a considerable distance, each becoming sheathed in a chitinous perisarcal tube, the outermost strand finally bends outwards and becomes free to form a branch (*vide* text-fig. 142, p. 496). The hydranth-bearing ramuli originate in the same way as the branches. Hydranths cylindrical, with club-shaped proboscis and many scattered filiform tentacles.

Gonosome.—The reproductive bodies are permanently fixed gonophores of a simple type. They are blind sacs arising from the cœnosarc some distance beneath the hydranth and lying within the perisarcal tube from which the hydranth projects. The ova are developed in the wall of the sac.

The genus *Soleniopsis* is distinguished by its peculiar mode of branching and by its gonophore. The branching, which is more fully described in the discussion on the species, appears to be similar to that of *Corydendrium* (Weismann, 1883). I have not seen the original description, but Dr. Fowler says with regard to the branching of the genus, "The young buds, instead of breaking through the perisarc and growing outwards as is usual, grow upwards for some distance inside it and surround themselves with secondary perisarc" (Fowler, 1900, p. 13); and this agrees with the structure in the present genus. *Corydendrium* differs from *Soleniopsis*, however, in having gonophores which give rise to free medusæ (Delage, 1901).

The gonophores here are of great length and of extremely simple structure. They are also peculiar in lying within, and thus being protected by, the tube which contains the trophosome, instead of bursting through the perisarc and forming hernia-like globular projections like most other gonophores. The ova and spermatozoa apparently escape from the mouth of the tube, passing between the swollen bulb beneath the neck of the hydranth and the perisarcal wall.

On account of the scattered filiform tentacles on the hydranth

* The name of the genus, *Soleniopsis*, is intended to suggest the resemblance between the parallel-lying cœnosarcal strands of the colony and the "solenia" of Alcyonarians.

and of the fixed gonophore, this genus has been included in the family Clavidae, although the simplicity of the gonophore and the complexity of the branching almost warrant the formation of a new family.

SOLENIOPSIS DENDRIFORMIS, sp. n. (Plate XXVI, fig. 1; text-figs. 142, 143.)

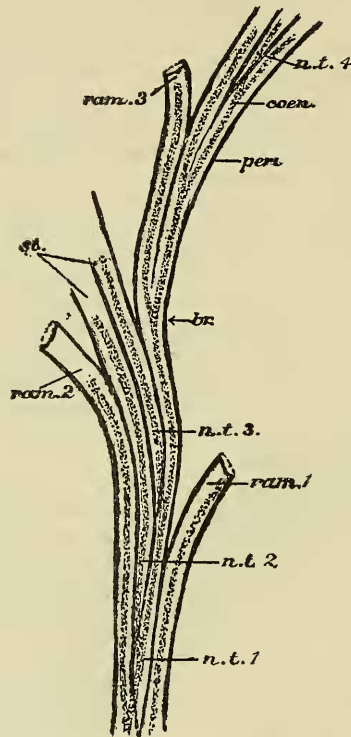
The colonies for which this species has been formed were found at two localities. The solitary colony from Boa Vista is the largest of the series, almost 10 cm. high, with a thick, fascicled stem which is, towards the base, covered by a mass of ramifying tubes, forming a spongy tissue through which here and there a hydranth projects. This loosely-built basal mass attains a diameter of 1 cm. From this stem, which in transverse section shows a small central strand of chitin with a few minute cœnosarc-containing canals, surrounded by many parallel tubes which again are surrounded by irregularly arranged, loosely aggregated tubes, the branches arise approximately in one plane. The colonies from St. Vincent are smaller, only 6 cm. high, and lack the spongy basal thickening, possessing a cylindrical stem 2 mm. in diameter, composed of closely packed parallel tubes. From these stems, as from that of the previous specimen, flabellate branches lying generally in one plane arise. The primary branches bear alternate secondary branches, and these again may bear tertiary branches, all of these appearing to be fascicled owing to the apposition of several tubes. Single, monosiphonic branches, however, arise alternately in one plane, for the most part from branches of the second and third order, and from the distal end of these the hydranths project.

The mode of branching is peculiar. In the less strongly fascicled portions of the stem two or three perisarcal tubes lie alongside of, and inseparably united to, one another, each containing a strand of cœnosarc. Some considerable distance before a free branch originates (frequently 20 or 30 mm.) one of the outermost strands divides into two, and round the new cœnosarcal division a chitinous tube is formed, wedged in between the old tubes. Thus the number of parallel-lying and united tubes is increased, but finally, after a course of some 2 or 3 cm., the outermost of the two portions into which the original strand divided becomes free to form a branch, and the number of tubes in the fascicle is thus reduced. The cœnosarc of the free branch divides, as did that of the stem, and becomes ensheathed in several united tubes which, on bending outwards and becoming free, form new branches or hydranth-bearing ramuli. The division of the cœnosarcal strands, and consequently the origin of the branches and ramuli, takes place alternately, first on one side, then on the other.

The hydranths project from simple, alternate ramuli 0.4 mm. in diameter. Extended they are long and slender, 2.0 mm. by 0.2 or 0.3 mm., almost cylindrical, with a prominent club-shaped

proboscis and short (0.3 mm.) stumpy tentacles. These, between 40 and 50 in number, are scattered over the body of the polyp, only the distal 4 or 5 being placed in a whorl, although an approximation to whorling is sometimes simulated by others of the tentacles. At the proximal end of the hydranth there is a short neck, and just within the margin of the tube a sharp bulge connecting the polyp with the cœnosarc of the ramulus and almost

Text-fig. 142.



Soleniopsis dendriformis. To show mode of branching, $\times 8$.

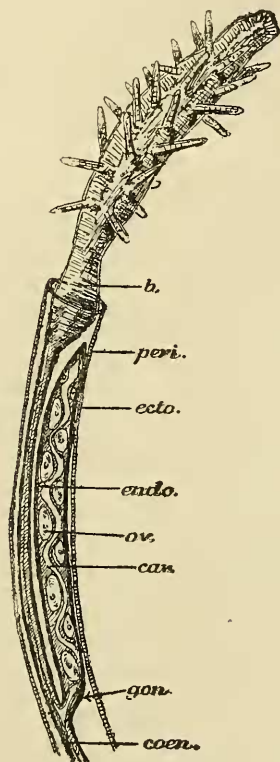
coen., cœnosarc; *peri.*, perisarc; *br.*, branch bending off and becoming free from main stem; *st.*, main stem; *ram.* 1, 2, 3, short ramuli from which hydranths project; *n.t.* 1, 2, 3, 4, new tubes, enveloping a branch from a cœnosarc and wedged in between older tubes.

plugging up the entrance to the tube. Contracted, the hydranths form almost spherical bulbs about 0.7 mm. in diameter. Although the tube from which the hydranth springs generally ends abruptly with an even circular margin, in not a few cases the terminal

portion is wrinkled and twisted as if it were less strong, more collapsable than the other portions.

Gonosome.—The gonophores are fixed, not developing into free medusoids, and lie within the tube from which the hydranth projects. They branch off from the cœnosarc of the ramulus from 2 to 3 mm. below the hydranth itself, and are long, slender, spindle-shaped bodies, sometimes 2.5 mm. in length by 0.1 mm.

Text-fig. 143.



Soleniopsis dendriformis. Hydranth and gonophore, $\times 30$.

b., bulging portion at base of hydranth almost filling the opening of the tube; *peri.*, perisarc; *ecto.*, ectoderm, represented within the tube by a dark line; *endo.*, endoderm (lined); *ov.*, ovum; *cav.*, central cavity of gonophore; *gon.*, the arrow points to the place where the gonophore branches off the general cœnosarc; *cœn.*, general cœnosarc.

in diameter. Their structure is simple, the gonophore being apparently a hollow cylinder closed distally, with two-layered walls, a thick ectoderm and thinner endoderm, within which ova develop to the number of about 13 or more. The ova develop

all along the walls, pushing the endoderm inwards until it protrudes into the hollow of the gonophore. The male gonophores are similar in origin and shape to the female, but are in general considerably longer. In no case could a spadix be distinguished.

The structure of the gonophore above described is of the simplest type. It appears to be merely a blind branch of the general cenosarc of the colony within the walls of which ova develop.

Associated with the specimens were several creeping Hydroids, *Fillellum serpens*, *Cuspidella humilis*, *Campanularia mutabilis*, and an endoproctan polyzoon (*Clionella*?).

Localities. (a) St. Vincent, Cape Verde Islands: growing on the bottom of a lighter, 20th and 30th July, 1904.—(b) Dredged; Boa Vista, Cape Verde Islands, August? 1904.

Family BOUGAINVILLIIDÆ.

HYDRACTINIA VERDI, sp. n. (Plate XXIII. figs. 6 & 7.)

Among dredgings taken at Porto Grande four *Fusus*-like gastropod shells were obtained overspread by Hydractinia colonies. The nutritive hydranths, which grow in the grooves of the shell-sculpture, are in various stages of contraction, the longest 5 mm., the shortest with their ring of tentacles almost resting on the surface of the shell. The tentacles are short, set in two almost indistinguishable whorls, and vary in number from 9 to 12, 9 being perhaps most frequent. The hypostome is club-shaped. No spiral filaments are present, although along the margin of the shell there occur elongated polyps with insignificant tentacles. Short chitinous spines, about 0.3 mm. long, with jagged edges, occur throughout the colony, being arranged for the most part upon the ridges of the shell. The blastostyles are somewhat smaller than the nutritive hydranths, being about 1 mm. in height, but unlike those of *H. echinata* they bear well-developed tentacles eight or nine in number. The basal rhizom expansion is thin.

Gonosome.—The reproductive bodies are fixed gonophores arising from the body of the blastostyle some distance below the tentacles. They occur in a single whorl containing three or four individuals and are borne on short peduncles. In the specimens examined the gonophores were all female, containing three large ova; while in the more mature examples these were separated towards the exterior by pigmented bands running from the base towards the summit of the gonophore—branches of the spadix.

This species is closely related to *H. pacifica* described from Calbuco by Hartlaub (1905, p. 519), but that species differs in possessing about 15 tentacles on the nutritive hydranths, only 5 or 6 on the blastostyles; in lacking spines on the basal expansion; in bearing only one ovum in each gonophore.

Locality. Porto Grande, St. Vincent, Cape Verde Islands; 10 fathoms.

PODOCORYNE ANECHINATA, sp. n. (Plate XXIII. figs. 8, 9, 10.)

Sparsely scattered upon a small gasteropod shell (*Cerithium?* sp.) are the minute individuals of a Podocoryne colony. The nutritive individuals are club-shaped, only 0.9 mm. in height, with a prominent, cylindrical, flat-topped hypostome, from beneath which arise about nine tentacles, set in two closely approximated whorls. Both spiral filaments and spines are absent. The reproductive polyps, although they are somewhat smaller than the nutritive with about seven well-developed tentacles, resemble the latter in shape, being also club-like and possessing a prominent cylindrical hypostome. The basal expansion is formed of a single layer of chitinous tubes, forming wide rectangular meshes, the individual tubes being almost 0.1 mm. in diameter, and being marked laterally by minute honey-yellow dots, thickenings of the chitinous wall. The whole expansion is covered by a thin layer of cœnosarc.

Gonosome.—The sexual stage consists of free-swimming medusoids which arise in considerable numbers (as many as nine being present on one individual) from the median portion of the reproductive polyp. They are borne on well-defined peduncles. During the earlier stages the tentacles appear as four blunt knobs, but these develop considerably ere the medusoid is set free. Sexual products could not be distinguished in the medusoid buds.

The species here described is a near relative of *P. humilis* Hartlaub 1905. The latter form, however, differs in possessing a minute conical hypostome, small smooth spines, and a medusoid bud which is not mentioned as developing well-formed tentacles ere it is set free. The difference in the number of tentacles is of little importance, although it is to be noted that here they form two closely-set whorls, but the chitinous thickenings which occur along the sides of the rhizom strands (*vide* Pl. XXIII. fig. 10) may help to distinguish the present species.

Locality. Porto Praya, Santiago, Cape Verde Islands, 5 fathoms; 9th August, 1904.

Family EUDENDRIIDÆ.

EUDENDRIUM RAMOSUM Linnæus 1758.

A single, small, unfascicled colony about 4 cm. high. The branches and branchlets are strictly alternate, and the minute structure, except that the rings at the bases of the main branches are generally fewer in number, agrees closely with Hincks's figures (1868, pl. 13). The hydranths are well preserved and there were, in the examples counted, 23 or 24 tentacles surrounding a very distinct trumpet-shaped hypostome.

Gonophores not present.

Locality. Porto Praya, Santiago, 10 fathoms; 12th August, 1904.

II. CALYPTOBLASTEÆ.

Family HALECIDÆ.

HALECIUM BEANII Johnston 1838.

Several strongly fascicled, irregularly branched colonies. The delicate structure of the terminal branchlets is characteristic of the species. The branches differ from those in the specimen figured by Allman (1888, pl. xii. fig. 3*a*) in arising laterally from below a hydrotheca, instead of directly from the branch. The majority of the primary hydrothecæ differ from Allman's and from Hincks's (1868) figures in being sessile and adnate to the node from which they arise—the hydrotheca-tier springing from within the primary hydrotheca; but in these respects they agree with specimens from the French coast described by Dr. A. Billard (1904, p. 163), and with specimens from dredgings made by the Scottish Antarctic Expedition at Burdwood Bank, near Cape Horn (Ritchie, 1907).

The bright refringent points which encircle the base of the hydrotheca are in this species, as in others I have examined (1907, p. 515), points of attachment for strands from a fleshy disc at the base of the polyp, which is thus supported within its minute hydrotheca.

The gonosome is absent in the present specimens.

Locality. St. Vincent, Cape Verde Islands, growing on the bottom of a lighter; 30th July, 1904.

OPHIODES CACINIFORMIS, sp. n. (Plate XXIII. figs. 11 & 12; Plate XXIV. fig. 1; Plate XXV. fig. 5.)

Several small, delicate colonies, for which this species has been formed, arise at irregular intervals from a hydrorhizal stolon creeping upon a fragment of a sand-covered worm-tube. They are neither branched nor fascicled, and the largest is but 6·5 mm. in height. The stem is divided into short internodes, 0·4 mm. long in the proximal, but gradually lengthening to 0·6 mm. in the upper part of the colony. The distal end of each internode appears to divide into two equal, slightly diverging portions, one of which forms the peduncle of a hydrotheca, while the other bears the succeeding internode, the junction between the two internodes being marked by a single annulation.

The hydrothecæ lie in one plane, are placed one on each internode, and are alternate. They are borne on peduncles of varying length, from 0·05 to 0·2 mm., the upper portions of which are delicate and frequently crumpled, while the bases are thick-walled and, even when the hydrotheca itself has been destroyed, remain as projecting processes. The hydrothecæ themselves are shallow, trumpet-shaped cups, with much-everted margins, delicate walls, and a thin septum separating their cavity from that of the stem. Around the wall just within the margin is a row of refringent points formed by slight thickenings of the perisarc within the

hydrotheca, and to these are attached strands supporting a flattened disc-like portion at the base of the polyp. Such an attachment, of course, makes the retraction of the polyp impossible. The structure is identical with that which I have already described and figured in the genus *Halecium* (Ritchie, 1907, p. 525), except that in *Halecium* the basal disc rests upon the perisarcial septum at the bottom of the cup, while here a considerable space intervenes between the two, traversed by a narrow strand of cœnosarc connecting the polyp with the common cœnosarc of the colony. I would draw attention to the seeming inaccuracy of Hincks's figures (1868, pl. 45, figs. 2, 2') as regards the relations between polyp and hydrotheca. The hydranths, which are about 0.9 mm. in height, gradually increase in diameter upwards from the basal disc, but exhibit no distal contraction beneath the tentacles such as Hincks figures. The bases of the tentacles, which number about 23, are connected by a web within which the hypostome arises. A secondary hydrotheca, borne on a relatively long peduncle, may arise from the lower portion of the peduncle of a primary hydrotheca.

Nematophores occur frequently but irregularly. There is usually one on a peduncle, and sometimes one on an internode. They are sessile, cup-shaped, with delicate walls and everted margin, within which there is commonly a row of refringent dots. To these, as in the hydrothecæ, a basal cœnosarcial disc is attached. The sarcostyles correspond to those figured by Hincks (1868, pl. 45), with thin walls bearing scattered cnidoblasts, and a globular head where large numbers of these offensive and defensive cells are aggregated. When contracted, a sarcostyle measures about 0.4 mm., while one which was extended measured 2.0 mm. The cnidoblasts are narrowly oval, $17\ \mu$ by $3\ \mu$, and each contains a thread $220\ \mu$ long, armed near the base with a whorl of four barbs in the form of a cross, distal to which are smaller barbs pointing towards the tip of the thread and placed in four longitudinal rows, each of which contains about nine gradually decreasing barbs (Plate XXV, fig. 5). The cnidoblasts occur throughout almost the whole colony, but are particularly common on the basal discs of sarcostyle and polyp, and at the tips of the sarcostyles and of the tentacles.

Occasionally solitary hydrothecæ and nematophores arise from the hydrorhizal tube.

The gonosome is not present.

Locality. Porto Praya, Santiago, 10 fathoms; 12th August, 1904.

Family L A F O E I D Æ.

FILELLUM SERPENS (Hassall 1852).

This species is represented by scanty specimens creeping on a fragment of a Gymnoblact colony. In essential characters the specimens agree with Hincks's description (1868), but they appear to be of less robust growth, while the margins of the hydrothecæ

are frequently marked by several "regeneration-lines," as in specimens from the North Sea in my possession.

The coppinia-gonosome is not present.

Locality. Creeping on *Soleniopsis dendriformis*, which was found growing on the bottom of a lighter: St. Vincent, Cape Verde Islands; 30th July, 1904.

CUSPIDELLA HUMILIS Hincks MS. & 1866.

Minute hydrothecæ arising here and there from a tubular stolon creeping upon *Soleniopsis dendriformis*. The hydrothecæ are delicate and cylindrical, generally 0.2 mm. in height by about 0.05 in diameter, although a rare specimen attained a height of 0.4 mm. They show in many cases a tendency to contract slightly towards the proximal end, while the distal end is crowned by convergent opercular segments. They agree with Hincks's description and figures of the species.

Gonosome not known.

Locality. (a) Creeping upon a polyzoon, which was obtained growing on the bottom of a lighter: St. Vincent, Cape Verde Islands; 20th July, 1904.—(b) Upon *Soleniopsis dendriformis*; 30th July, 1904.

Family CAMPANULARIIDÆ.

CLYTIA GENICULATA Thornely 1904.

Several small colonies, the largest rather under 1 cm. in height, growing on a polyzoon. The specimens agree in every respect with the original description and figures, the peculiar method of branching being particularly noticeable. The hydrothecæ, which are some 1.1 mm. long by 0.6 mm. in greatest diameter, bear from 18 to 20 long teeth; each tooth being strengthened by a median fold which is continued for a short distance down the wall of the hydrotheca as a more or less definite line.

The gonangia vary somewhat as regards their opening, sometimes having a plain, cylindrical, distal end; at other times with a distinctly constricted neck below the aperture. Sometimes they arise in pairs from the base of a pedicel.

Locality. Growing on polyzoa found on the bottom of a lighter; a single specimen on the back of a small crab. St. Vincent, Cape Verde Islands; 30th July, 1904.

OBELIA DICHOTOMA (Linnæus 1758).

A few delicate colonies, the largest only 4 mm. high, occur on the carapace of a minute crab. The stems, which are unfascicled, are divided by slanting nodes into regular internodes 0.4 mm. in length, from the distal end of each of which arises a hydrotheca. Branches are frequent, sometimes 1.5 mm. in length, arising in every case from the side of a pedicel. They are thus alternate, and, like the stem, they bear alternate hydrothecæ, from the pedicels of which smaller branchlets with one hydrotheca may

arise. Frequently the branches end in blind stolons. The hydrothecæ are alternate and are borne at the distal ends of the internodes on short pedicels marked by four or five annulations, the base of the internode above that from which the pedicel springs bearing a like number of rings. The calyces are short and subtriangular, with a rather wide aperture and an almost even, delicate rim. The whole colony is of delicate texture, the perisarc being remarkably clear and hyaline.

Gonosome not present.

The form described above seems to be a young stage of *O. dichotoma* Linn. Its much smaller size, its lack of horn-colour, its branches arising from *the side* of a pedicel, and the shorter subtriangular shape of its hydrothecæ, are differences insufficient to distinguish it specifically from the older form.

Locality. On the carapace of a small crab found crawling on the bottom of a lighter: St. Vincent, Cape Verde Islands; 30th July, 1904.

GONOTHYRÆA GRACILIS (Sars 1851).

A few small specimens of this beautiful species occur growing upon a fragment of calcareous material. The colonies are only 8 mm. in height, and differ from those described and figured by Hincks (1868) in that the hydrothecæ are somewhat less slender. The remaining characters—the peculiar origin of the branches, stuck on, one would almost think, as an afterthought, the gradual tapering of the hydrotheca towards its base, the number of the long pointed teeth, the ringing beneath the hydrotheca and at the proximal end of the branches—agree with previous descriptions.

Two long slender gonangia, with traces of a marginal collar as in Hincks's figures, are present, one arising from the hydrorhiza, the other from a peduncle.

Locality. St. Vincent, Cape Verde Islands, 10 fathoms; 27th July, 1904.

CAMPANULARIA CALICULATA Hincks 1863.

Typical examples of this species, with crenated pedicel, distal spherical segment, and thick-walled, smooth-rimmed hydrothecæ, occur creeping on a seaweed. In our specimens the pedicels average 0.5 mm. in length and are marked by about 10 crenations.

The gonangia are absent.

Locality. Porto Grande: creeping on seaweed in a shore-pool.

CAMPANULARIA PTYCHOCYATHUS Allman 1888.

Numerous crowded, pedunculate hydrothecæ, and gonangia springing from a creeping stolon have been found on a polyzoon. The specimens agree closely with Allman's description and figures, especially characteristic being the delicate, frequently collapsed, distal portion of the hydrotheca, which in our specimens bears 10 long teeth; the stem with a few rings (generally two) beneath the hydrotheca and with several at the base; the smooth

cylindrical gonangia with marked constriction beneath the shallow saucer-like top.

From locality *c* there are only a few hydrothecæ growing upon *Sertularia distans*, gonangia being absent.

Localities. (a) Creeping on a polyzoon found on the bottom of a lighter: St. Vincent, Cape Verde Islands; 30th July, 1904.

—(b) On a pebble, 10 fathoms: St. Vincent; 27th July, 1904.—

(c) Creeping on *Sertularia distans*: Porto Grande, shore-pools; ? July, 1904.

CAMPANULARIA MUTABILIS, sp. n. (Plate XXIII. figs. 3, 4, 5.)

Rare specimens occur creeping upon *Sertularia versluysi* and *Soleniopsis dendriformis*. From a thick-walled, creeping, hydro-rhizal tube the hydrothecæ arise at irregular intervals. They are borne on thick-walled peduncles with a length roughly three-fourths that of the hydrotheca, varying from 0.4 to 0.8 mm., and marked by from four to eight well-defined twists. The hydrothecæ are large but vary from 0.8 to 1.2 mm. in length and from about 0.5 to 0.6 mm. in breadth. They are almost campanulate in shape, gradually widening upwards to the margin, which is frequently oblique, is beautifully recurved, and is sometimes reduplicated (Pl. XXIII. fig. 3). A slight ridge of perisarc at the base of the hydrotheca forms a platform upon which a cœnosarcial disc at the bottom of the hydranth rests, and beneath this, seemingly within the peduncle, is a delicate basal septum. The hydrothecæ are seldom set symmetrically upon their peduncles. Owing to the state of preservation, the structure of the hydranth could not be recognised. The tentacles appeared to be few in number.

Gonosome not known.

Localities. (a) St. Vincent, Cape Verde Islands: growing on specimens obtained from the bottom of a lighter; 30th July, 1904.—(b) Piles of pier: Porto Praya; 12th August, 1904.

The specimens from Porto Praya (only a few hydrothecæ have been found) are considerably larger than those from St. Vincent, but the specific structures in the two sets of specimens are identical (*cf.* fig. 5 and figs. 3 & 4, Pl. XXIII.).

This species approaches *Lafoëa pocillum* Hincks 1868, from which however it differs greatly in shape and in possessing an everted margin. From *Campanularia corrugata* Thornely 1904, it may be distinguished by its strongly-twisted peduncle, its campanulate shape, and its non-corrugated walls.

Family SERTULARIIDÆ.

SERTULARIA DISTANS* Lamouroux 1816.

A species represented by a few colonies growing upon a seaweed. The largest specimens are 7 mm. high, while the internodes

* In accordance with the recent determination of Dr. A. Billard (1907), who has had an opportunity of examining the type specimen of Lamouroux, I have substituted the designation of that author for the more usual synonym *S. gracilis* Hassall.

average 0.4 mm. in length. The hydrothecæ are free for rather more than half their height distally, the free portion being sharply divergent. The margin is divided into two lateral teeth, and there are two opercular flaps. The specimens agree closely with the descriptions and figures of Hincks (1868) and Nutting (1904).

Gonangia not present.

Locality. Porto Grande: shore-pools; ? July 1904.

SERTULARIA MAYERI Nutting 1904.

Several specimens of this species have been obtained. The specimens agree in all respects with the description given by Nutting, except that in our forms, which are smaller than the American specimens—the maximum being about 7 mm.—the hydrothecæ appear to be rather more closely approximated, the length of an internode being only 0.6 mm. While in many cases the margin and operculum had collapsed, as described by Nutting, in others this portion of the hydrotheca retained its form, and two large lateral teeth, with sometimes a minute median superior tooth, and a two-flapped operculum could be distinguished.

Gonosome not known.

Localities. (a) Porto Grande, St. Vincent, Cape Verde Islands: creeping on seaweed found in shore-pools.—(b) On seaweed found by diving among coral in 2 fathoms of water: St. Vincent, 22nd July, 1904.

SERTULARIA VERSLUYSI Nutting 1904. (= *Desmoscyphus gracilis* Allman 1888.) (Plate XXIV. figs. 2, 3, 4, 5, 6, & text-fig. 144.)

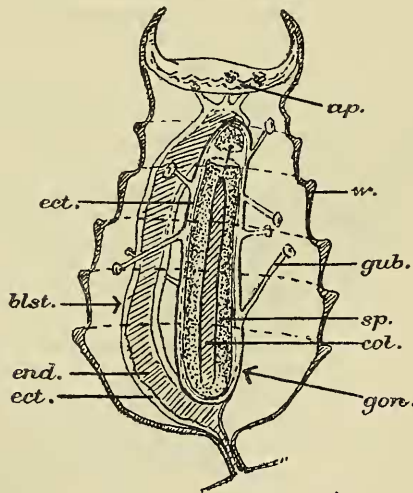
A large number of colonies varying from 2 to 4 cm. in height. The stem is erect, unfascicled, and springs from a spreading mass of hydrorhiza. The lower portion of the stem for a distance varying from 3 to 10 mm. is smooth, thick-walled, and unbranched, and usually bears two straight internodes. The remainder, which is separated from the unbranched portion by a long, sloping, splice-like joint, is divided by slanting nodes into regular internodes about 0.7 mm. in length, each bearing three hydrothecæ—two on one side, one on the other. From beneath the lower of the two hydrothecæ the branches arise. They are about 4 mm. long, are regularly alternate, thus giving the colony a plumose appearance, and are divided into internodes, 0.4 mm. long, by nodes which slope from behind forward and downward. They are placed slightly on the front of the stem, and are borne on a long stem-process, but arise at an angle of 60° rather than at right angles as described by Nutting.

The hydrothecæ are placed on the front of stem and branches; on the former they are alternate and apart, while on the latter they are opposite, and contingent for the greater part of their length, the distal free portion being bent at right-angles to the adnate portion. The hydrotheca pairs are distant from one another about the height of a hydrotheca. The hydrothecæ, short

and stout proximally, gradually narrow towards the opening, which is furnished with two long, thick-rimmed, lateral teeth. The operculum is composed of two flaps, in this agreeing with Nutting's description and differing from that of Versluys (1899, p. 43), where only a single flap is mentioned.

Gonosome.—The gonangia, which are characteristic, have not been previously described. They are 1 mm. high, borne on short stalks on the front of the stem, generally one on each internode, and arise from near the base of a hydrotheca. They are strongly compressed from back to front, somewhat flask-shaped, with their greatest diameter (0.6 mm.) near the base and gradually narrowing towards the top, where a slight neck is surmounted by a flattened disc bearing two long, incurved, horn-like spines. These are placed, one on each side, immediately above the longitudinal lateral ridge formed by the compression of the gonangium. The gonangia are strongly ridged throughout, the ridges varying in number from five to eight. The gonangial contents escape through a longitudinal slit with toothed edges, stretching along the flattened top of the gonangium from "horn" to "horn."

Text-fig. 144.

Male Gonosome of *Sertularia versluysi*.

ap., aperture with toothed lips through which gonangial contents escape; *w.*, wall of gonangium; *gub.*, gubernaculum; *sp.*, spermary; *col.*, central column of gonophore; *gon.*, gonophore; *ect.*, ectoderm; *end.*, endoderm; *blst.*, blastostyle.

A peculiar modification was noted in one of the specimens examined, where the distal and posterior portion of a branch-internode had become free and was prolonged into a straight

sharp spine lying almost parallel to the continuation of the branch. The spiny appearance of the branch-bearing processes of the stem when denuded of their branches is also noteworthy (*cf.* Allman, 1888, p. 72).

Locality. Porto Praya, Cape Verde Islands: piles of pier; 12th August, 1904.

Other localities:—Off Bermuda, 30 fathoms ('*Challenger*'); Cape Verde Islands, 25 metres (*Versluys*); on floating gulf-weed ('*Albatross*'); N.W. of Cape Blanc (Soudan), in 55 to 60 metres (*Billard*, 1906).

In the colonies examined, the gonophores were all male and in an advanced stage of development. Their structures resemble those of *Sertularia punila* as described by Nutting (1904, pp. 26 *et seq.*), but in most, owing perhaps to the advanced stage of the gonophore, the blastostyle is comparatively small, and in no case could be observed to terminate in a thickened plug or "Deckenplatte." On the other hand, delicate strands of ectoderm stretched from the outer coat of the gonophore to the gonangial wall, to which they were attached, thus mooring the gonophore within the gonangium. Nutting, who also has found similar "gubernacula" in a male gonangium but arising from a sperm-bearing blastostyle instead of from a true gonophore, suggests that they may connect the ectoderm of the blastostyle, or in this case of the gonophore, with a delicate ectodermal layer which in some cases lines the inside of the gonangial walls (Nutting, 1904, p. 29). In these specimens I have been unable to detect the presence of an ectodermic gonangial layer such as Nutting describes. He also suggests that they may possess the nutritive function attributed by Weismann (1883) to the gubernacula of "*Sertularia punila*."

SERTULARIA LEVIMARGINATA, sp. n. (Plate XXVI. figs. 5 & 6.)

Several minute colonies, less than 3 mm. in height, spring from a creeping hydrorhizal tube which ramifies over a polyzoon-encrusted frond. The stems are unfascicled and unbranched and are divided into distinct internodes, about 0.3 mm. long, which become much constricted in the neighbourhood of the nodes. The portion of the stem proximal to the first distinct node, which slopes at a high angle from back to front, is athecate, but each internode bears two opposite hydrothecæ towards its distal end.

The hydrothecæ rest upon a bulging portion of the internode and are somewhat ventricose, the bulging portions meeting on the front of the stem, but being slightly separated, for 0.01 mm., behind. For less than half their height they are adnate to the stem, but the distal portion (about 0.28 mm. in length) bends sharply outwards, so that the apparent upper sides form an almost straight horizontal line. The free portion becomes gradually constricted and tube-like towards the margin, which is smooth and is characterised by a shallow sinus on its upper edge, at the base of which is attached a disc-shaped adcauline operculum.

This operculum is frequently drawn within the hydrotheca. The aperture faces obliquely upwards.

The gonosome is absent.

Locality. Creeping upon a leaf found in one of the bottles containing Mr. Crossland's collection of tunicates from Mattiotta, St. Vincent Harbour, Cape Verde Islands.

The peculiarly shaped hydrothecæ in the present specimen bear some resemblance to those of *Sertularia lucernaria* Kirchen. 1864; but in that species the aperture is almost horizontal, with a very distinct margin, the hydrothecæ are widely separated, and the colonies are branched, with a bushy habit of growth, altogether different from the minute, simple, and scattered colonies of *S. laevimarginata*.

Family PLUMULARIIDÆ.

PLUMULARIA HALECIOIDES Alder 1859.

This species is represented by a few specimens, attaining a maximum height of 2.5 cm., which agree closely with the description of Hincks (1868). The following variations from and additions to that description were noted:—The branches, which are rare and may arise on any side, spring in the specimens examined, not from the original hydroclade-bearing tube, but from one of the secondary tubes of the stem-fascicle; the hydroclades bear up to six hydrothecæ in place of Hincks's maximum of four; intermediate athecate internodes are not always present between thecate internodes, thus in 100 internodes examined only 31 were athecate and intermediate, a pair of the latter rarely occurring together; the gonangia, for the most part strongly ringed, occur not only on the stem but also on the hydrothecal tubes. Similar variations have been noted by Billard (1904, pp. 181 *et seq.*) in specimens from the French coast and from Algeria.

Locality. St. Vincent, Cape Verde Islands: growing on the bottom of a lighter; 20th July, 1904. Also found on 22nd July, 1904, by diving among coral in a depth of 2 fathoms.

MONOSTECHAS QUADRIDES (McCrary 1857). (Plate XXV. fig. 4.)

Two colonies have been referred to this species. They differ markedly in size and habit from the flabellate, dichotomously branched, 6-inch high specimens described by Nutting (1900, p. 75); for they are unbranched and but 1 cm. in height. Nevertheless the minute structure agrees so closely with Nutting's descriptions and figures, that I cannot regard these specimens as specifically distinct. I noted, however:—(1) The peculiar manner in which the hydroclades arise from the stem. The distal portion of the stem-internode bends over towards the anterior aspect of the stem, and to the end of this bent portion the hydroclade is attached by a slanting node; while from the posterior

portion of the bend a second stem-internode arises, at an angle with the first. Each hydroclade lies in a line with the stem-internode from which it arises, and from the posterior aspect of which the succeeding stem-internode is thrown off at an angle (Pl. XXV. fig. 4). The structure of the colony thus comes to resemble that of a helicoid cyme. (2) An unprotected sarcostyle, not mentioned by Nutting, issues from the angle between the hydrotheca and its internode. The arrangement of the nematophores agrees with that in Nutting's figure, pl. xiii. fig. 2, except that the supracalycine nematophores more closely resemble those in fig. 4, scarcely reaching the margin of the hydrotheca. On the stem-internodes, of which there are only four in our largest specimen, the nematophores vary from 3 to 5.

Gonosome not present.

Locality. St. Vincent, Cape Verde Islands, 15 fathoms; 30th July, 1904.

In the collections made by Professor W. A. Herdman, F.R.S., in connection with the Gulf of Manaar Pearl Fisheries Investigations, small specimens of this species occur similar in size to those above described—"half an inch is the height of the largest colony" (Thornely, 1904, p. 120).

AGLAOPHENIA MARGINATA, sp. n. (Plate XXIV. figs. 7, 8, 9, 10.)

Slender, monosiphonic colonies reaching a height of 6 cm. The normal condition of the colonies is simple, for in only one specimen was a branch found, springing from the anterior surface of the stem. The stem is divided into internodes, 0.5 mm. in length, each bearing a hydroclade on a prominent, rounded and perforated process lying midway between the nodes. The hydroclades are short, generally less than 3 mm., set forward on the stem, alternate, and divided into internodes 0.35 mm. long, each of which bears a hydrotheca. Two internodal septa are present, one proximal and opposite the intrathecal septum and extending completely around the internodal wall; the other distal and less pronounced, opposite the base of the supracalycine nematophores, and sloping slightly upwards.

The hydrothecæ are small, 0.25 mm., closely approximated and rather deep, with a concave anterior profile, and a slightly oblique margin marked by nine teeth, which increase in size towards the anterior of the calycle. A distinct, horizontal septum traverses the hydrotheca cavity about a fifth from the base. The supracalycine nematophores are small, just reaching the level of the hydrotheca margin. The mesial nematophore is adnate for little more than half the height of the hydrotheca, and has but a short divergent "beak" free. There are two nematophores on each stem-internode, one opposite, the other distal to, the hydroclade-bearing process.

The stem is of a horny-brown colour, which fades into a faint yellow towards the tip.

Gonosome.—The corbulæ are about 1.7 mm. in length by 1 mm. in breadth, elongate-oval in shape, with 7 or 8 pairs of corbula-